DETAILED TECHNICAL SPECIFICATION FOR POTENTIAL DETECTOR WITH FRP TELESCOPIC ROD

1. SCOPE

Supply of Potential detector cum Induction Potential detector suitable for detection of **liveness of 240V to 400 KV** overhead line (bare conductor). The equipment shall have variable voltage selection for detecting the Induced voltages during maintenance due to parallel and cross over effect. The Potential Detector starts producing visual indication as well as audio annunciation indicating that the line is LIVE and not safe to earth and not to carry any work on the line.

2. Applicable Standards: As per the relevant IEC/IS with latest amendment like TR61243-6 for Contactless Potential detector and ASTM-F711, IS 10661-1983, IEC 61235-2019/IS 16622-1993 for FRP Telescopic rod.

The following Type test certificate shall be applicable for Contactless Potential detector and FRP telescopic rod as per IS / IEC standards.

2.1 Contactless Potential Detector

a. Dry Power Frequency withstand Test at 440 kV along with FRP telescopic rod as per IEC 60060(2010)/IS 2071-1 (2016).
b. Wet Power Frequency withstand Test at 440 kV along with FRP telescopic rod as per IEC 60060(2010)/IS 2071-1 (2016).
c. Insulation Resistance Test on device shall be more than 1 Gohm as per general requirement.
d. Low temperature (Cold) Test and High Temperature (Dry Heat) and as per IS 9000 (Part II) 1977 & IS 9000 (Part III) 1977
e. Power Frequency Magnetic Field Immunity Test as per IEC 61000-4-2 Ed. 2.0:2008
f. Electromagnetic Radiation Test as per IEC 61000-4-8 Ed. 2.0:2008
g. Radio Frequency Electro Magnetic Field Immunity Test as per IEC 61000-4-3 Ed. 4.0:2020
h. Electromagnetic radiation disturbance measurement as per CISPR 11: 2015 + AMD 1: 2016: AMD 2: 2019 class A
i. IP 54 Degree of Protection as per IEC 60529:2001

2.2 FRP Telescopic Stick (1-set comprising of 4 sticks)

a. Lighting Impulse Voltage Withstand Test for both polarities as per IEC 60060(2010)/IS 2071-1 (2016).
b. AC Di-electric Strength Test for 100 kV Per feet on FRP Telescopic Rod: The Test voltage of 100 kV AC rms applied between H.V. Terminals and Earth (Across the length of 1 feet) as per ASTM-F711.
c. Measurement of Leakage current before & after humidity Test as per IS 2071-1 (2016).
d. Insulation resistance Test.
e. Tensile Strength and Barcole Hardness as per IS 10661-1983
f. Izod Impact test as per ASTMD 256/IS 180.

g. Glass Content Test Minimum 50 to 75%as per IS 10661-1983
h. Bending Test as per IEC 61235 : 1993
i. Crushing Test as per IEC 61235 : 1993
j. To test Dry penetration test: Live working insulation foam filled tubes and solid rods as per IS 13770:1983
k. Flammability Test as per IS 6747-1994

3. Technical Parameters with features for Contactless Potential Detector

Sl No	Description	Specification
a	Application of the equipment	Application of Contactless Potential detector in Overhead Power lines, Distribution Lines, Switchgear units & sub stations to detect the presence of the voltage in charged **240 V to 400 kV** as per IEC 61243-6 on bare conductors & also to detect the induced voltage in uncharged substation Bays, Bus bars, Distribution Lines for safe operation & for maintenance activities. The detection to be carried out before arcing zone with Audio and Visual Indication.
b	General & Constructional Requirements	1. Potential Detector shall be designed and constructed in such a way so as to avoid any danger to the operating personnel during use and under normal conditions. It should have the capability to warn the user by audio annunciation as well as visual indication of the presence of voltage from a safe distance. 2. Bright high intensity LEDs red coloured to provide clear visual indication even in unfavourable daylight conditions. A buzzer produces a loud beep which is audible even in noisy back grounds. The minimum sound intensity of Contactless Potential detector shall be 70 dB +/- 5% 3. The Potential Detector should have universal connecting link for the attachment of the Telescopic rod. 4.
c	Dimension of Device	145 mm (L) x 105 mm (W), +/- 5% (Including Universal Link of 58 mm +/- 5%) Bottom: 105 mm x 105 mm, +/- 5% Top: 72mm x 72mm, +/- 5%
d	Weight - Device	250 grams +/- 5%
e	Environmental Condition	Operating Temperature: -10°C ~ +55°C Storage Temperature: -10°C ~ +60°C Relative Humidity: 93% +/- 3%

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f	Detection Range	The Potential Detector should have the unique capability to warn the user the presence of Voltage from a safe distance and must be exceptionally sensitive. The distance of detection in Meters (M) to be matched as below which could be equal or more. 0.05 M for 240 V to 415 V, 0.2 M for 11 kV, 1 M for 66 KV, 2M for 220kV & 4M for 400kV. Separate selection to be provided for each Voltage class
g	Functions	1. Voltage detection on charged Lines 2. Induced voltage presence on uncharged Lines
h	Selectable Voltage range	For Live line Detection with following steps of selection 240 V, 415V, 11 kV, 66 kV, 220kV & 400kV.
i	Self-Diagnostic Feature	The Potential Detector shall be capable of performing complete self-diagnostic check with buzzer & flashing LED to ensure the correct functionality of the equipment automatically as soon as switched on.
j	Power Supply	9V Battery, Alkaline Power Consumption: Contactless Potential detector current consumption shall be minimum 25mA for Maximum voltage Selection.
k	Low Battery Indication	Separate LED should be provided for low battery Indication for error free operation at site. Contactless Potential detector should Indicate Low battery LED indication when battery voltage goes less than 5V.
l	IP Rating	IP 54, Degree of Protection as per IEC 60529:2001
4	**FRP TELESCOPIC ROD**	
a	Telescopic Rod Design and Construction	1. The Telescopic rod shall be of Triangular Design having Premium Quality Insulated rod with Piece-to-piece self-Locking in unidirectional arrangement as per ASTM-F711, IS 10661-1983, IS16622:2019/IEC 61235:1993. 2. Telescopic rod shall be of retractable i.e uni directional locking system to avoid any tilt during field operation by using Triangular Design. 3. Telescopic rod shall be of Rovings Pultrusion tubes made of out of fibre Reinforced Polyester (FRP) with boron free glass rowing with locking buttons. The glass content shall be minimum of 50-75% as per standard. 4. The Top section of Triangular Telescopic rod shall be filled with Polyurethane foam to avoid moisture to get in.

Sl No	Description	Specification
		5. The Triangular Telescopic rod head shall adapt with universal link. 6. The FRP Triangular Telescopic Rod Total extendable length shall be minimum 7Mtr. Total number of sections used to manufacture 7 Mtr telescopic rod shall be 4 nos. The telescopic rod each section shall have closed height shall be less than 2 Mtr and extended height-7Mtr. The Top section of the Telescopic rod shall be foam filled to prevent from moisture. 7. The diameter of the Telescopic Triangular stick shall be as follow: 29mm,36mm, 42mm & 48mm The Wall thickness of the sections used to manufacture Telescopic rod shall be minimum of 2.5mm. 8. The Telescopic rod shall be of Red colour 9. Tolerance for all measurements: +/- 5% 10. All the required sticks shall be provided with Special Spring loaded Self- locking system with Guided couplers. The Total weight of the FRP Telescopic Triangular stick shall be less than 5 kgs.
b	Protection	a. The retractable FRP Triangular telescopic Rod shall be of electrically non- conducting, non-allergic, non-hygroscopic, non-ageing material of tested quality. A silicon petticoat arrangement shall be fixed on Bottom stick for decrease of the flash over contact probability with the operator. b. The FRP Triangular telescopic Rod shall have a rubber gripper for holding it firmly when making measurements of H.T. Lines.
C	Special Features	a. The FRP Telescopic rod shall be free from all foreign bodies and without any pin holes. b. The Inner and outer surface of FRP Telescopic rod shall be smooth and glossy. c. The FRP Telescopic rod shall have very good mechanical strength, Excellent dielectric strength and free from the water absorption. d. The weight of the FRP Telescopic rod shall be suitable for easier handling/operation by single person.

Sl No	Description	Specification
d	Packing and Marking	Each Potential Detector and FRP Telescopic Rod shall be suitably packed in Separate carry bag with shoulder strap Shall be marked with the following information a. Name of manufacturer: b. Year of manufacturing: c. Batch No: d. LOGO and letter 'BESCOM" shall be marked in blue colour on Potential Detector and LOGO and letter 'BESCOM" and OPERATE WITH GLOVES FOR SAFETY" shall be marked in blue colour on FRP Telescopic Rod at every meter length. e. Logo and letter 'BESCOM" and "OPERATE WITH GLOVES FOR SAFETY" shall be marked on FRP Telescopic Rod at every meter length in Blue Colour
e	Inspection	All the Materials shall be accepted subjected to following Pre-Dispatch Inspection. a) Visual Inspection b) Dimensional Check c) Dry Power Frequency withstand Test at 440 kV as per IEC 60060(2010)/IS 2071-1 (2016) at factory/ CPRI/ ERDA or any NABL Accredited Govt testing labs for selected samples. d) AC Di-electric Strength Test for 100 kV Per feet on FRP Telescopic Rod: The Test voltage of 100 kV AC rms applied between H.V. Terminals and Earth (Across the length of 1 feet) as per ASTM-F711 for selected samples. e) Insulation Resistance Test on device shall be more than 1 Gohm as per general requirement for selected samples. f) Manufacturer shall have in house Testing facility for dry power frequency test or shall make arrangements for testing at factory/ CPRI/ ERDA or any NABL Accredited Govt testing labs for selected samples and declaration for the same shall be submitted by bidder.

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